V.—Pepper Growing in Upper Sarawak.—By G. Dalton.

Historical.

A large area of the low, undulating land watered by the Sarawak River and its upper branches, has been for a long time past given over to the cultivation of the pepper-vine; and it is with the pepper industry of this region that the following notes propose to deal.

In regard to the general cultivation of this plant in Borneo in former days, we learn from Messrs. Baring-Gould and Bampfylde's recent book * on Sarawak, that as far back as the middle ages "this cultivation attracted "particular attention to the island; and to obtain a control "over the pepper trade by depriving the Turks of their "control over the trade in spices was one of the main "incentives to the discovery of a route to the East by the "Cape." The same writers go on to suggest that pepper was probably introduced first by the Hindus, and that the Chinese, finding the industry a profitable one, improved and extended its cultivation. In 1809, we are told, the estimated export from Brunei was 3,500 tons, and that a hundred years before that the export from Banjermasin was 2,000 to 3,000 tons. Sir Spenser St. John † in 1856 noticed remains of deserted pepper-gardens far up the Limbang River (Kuala Madihit), which were known to have been worked by a not-long-departed settlement of Chinese, and other writers have made similar notes on this subject in different parts of Borneo.

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* *A History of Sarawak under its Two White Rajahs*, by S. Baring-Gould and C. A. Bampfylde, 1909, pp. 430, 431.

† *In the Forests of the Far East*, by Sir Spenser St. John, 1863, 2nd Ed., Vol. II., p. 330.

Turning now to the history of the pepper industry in Sarawak proper, of which the land drained by the Sarawak River forms the central and most important district, Messrs. Baring-Gould and Bampfylde write that:—"After many previous failures the foundations of this large industry, which is entirely in the hands of the Chinese, were laid in 1876 by the Rajah in conjunction with certain local Chinese merchants."*

After that date the industry steadily prospered and eventually Sarawak Pepper gained for itself the name of being superior to any grown elsewhere. The Keh. Chinese, who are the principal growers, found it extremely profitable, and numbers flocked into the country to cultivate the article; the gold workers in the same district gave up their uncertain work in favour of this surer road to riches, and when the highest prices were reached some six years ago, many of them wisely took the opportunity to sell out and return home to China with their fortunes made. With prices of $60 and more per pikul for white pepper and about $30 for black to be obtained in those days at an expenditure of about $10 to $15 per pikul, it will at once be seen that as a profitable undertaking, that of pepper-growing left little to be desired. However, such is the way of "booms," after a big rise, there comes a heavy fall, and this pepper boom was no exception to the rule; so the prices dropped lower and lower, and a great many of the smaller planters, spoiled by the high prices previously reigning and unable to give up their acquired luxurious ways of living, were completely ruined; some go so far as to say that the Sarawak pepper industry was killed. During the last two or three years, however, there has been a slow but steady recovery, confidence is returning, more gardens are being taken up again, and as if in sympathy with the unfortunate planters, the price of pepper has slowly risen. And with the present price of $30 odd per pikul for white pepper, and $15 for black, quite a good profit can even now be made.

The following table† shows the growth and decline of the Pepper Industry in Sarawak.

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* *Op. cit.* p. 436.

† Obtained from statistics published in the *Sarawak Gazette*, 1901–1909, and the *Sarawak Government Gazette*, 1910–1911.

Amount (in pikuls) of White and Black Pepper exported from 1900–1910:—

	1900.	1901.	1902.	1903.	1904.
White Pepper ..	32,967	37,016	41,806	56,475	59,295
Black Pepper ..			4,694	4,510	3,809

	1905.	1906.	1907.	1908.	1909.	1910.
White Pepper	66,920	80,275	76,109	76,164	62,565	55,205
Black Pepper	7,664	10,217	10,834	8,783	7,043	6,203

The following table * shows the number of pepper-gardens and vines registered annually in Sarawak proper during the same period:—

	Kuching.		Bau.		Paku.	
	Gardens.	Vines.	Gardens.	Vines.	Gardens.	Vines.
1900 † ...	901	864,910	1,049	908,230	... ‡	...
1901 ...	196	108,973	230	99,262	...	...
1902 ...	196	98,221	90	32,318	90	31,300
1903 ...	250	122,910	104	38,684	178	67,960
1904 ...	337	170,222	89	36,310	177	54,920
1905 ...	329	192,729	59	20,210	89	29,412
1906 ...	102	36,230	31	6,791	46	11,310
1907 ...	56	23,080	19	5,890	21	5,050
1908 ...	25	10,600	5	3,485	14	1,350
1909 ...	35	15,930	..	...	1	200
1910 ...	53	18,220	5	1,214	14	3,770

The increase shown from 1908 to 1910 is being maintained, and up to December 78 gardens with 26,190 vines have been registered during 1911 in Kuching.

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* Compiled from statistics supplied by Mr. G. C. Gillan, Government Registrar, and Mr. C. Ermen, Resident in Charge at Bau, to whom my best thanks are due for their kind assistance.

† The first order providing for the registration of Pepper Gardens was issued in 1900, hence the large number registered that year.

‡ Gardens in Paku district were registered at Bau during 1900 and 1901.

It should be noted that a certain number die out every year, but as these are not always reported accurate figures are not obtainable.

Pepper.

The species in cultivation here is that known scientifically as *Piper nigrum*, which belongs to the order *Piperaceae*. Flowers are usually diœcious. Distribution: India, Ceylon and the East Indies generally.

Soil.

Practically the whole of Upper Sarawak, where the pepper vine is cultivated, consists of a stiff yellow clay, which quickly becomes friable on exposure to the elements; this forms an excellent base for the main roots of the growing vine, and the Keh Chinese have learnt that good top soil, which has an underlayer of the stiff clay, when collected and carefully burnt, forms a perfect top dressing. All sandy soils make poor burnt earth. The making of good burnt earth is a fine art, the slightest actual *burning* of the soil reducing the earth to a very poor article; it needs gently roasting, and from start to finish requires watching. It is essential that all pieces of charcoal should be picked out of the finished product.

Rainfall.

The average annual rainfall * registers some 150 inches, two-thirds of which fall during the North-east Monsoon; droughts of over 30 days are rarely experienced.

Position.

The best position for a garden is a plane, preferably in a sheltered position, which slants slightly towards the east.

Preparation of Ground.

The jungle is felled and burned, and afterwards all remains of stumps and roots, etc., are collected into heaps, covered with top soil and fired. The ground is next lined and sticks about 4 feet high are placed 6 × 6 feet to mark positions for the vines, drains being allowed for where necessary.

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* For notes on Kuching rainfall see Shelford in *Sarawak Gazette*, 1902, p. 141; Hewitt, *op. cit.* 1906, pp. 27-31, and Moulton, *op. cit.* 1911, pp. 9, 10.

The ground is now left for one to two months to dry and is kept quite free of weeds, etc., whilst good drains are made all round.

Next the ground round the sticks is hoed to the depth of a foot and then piled up to form small mounds about one foot six inches high, and to these mounds is carried the burnt earth obtained from the burning of the stumps, etc.

Planting.

The vine is invariably propagated by cuttings, plants from seeds proving too unreliable, these cuttings are obtained from the terminal shoots of $1\frac{1}{2}$ to $2\frac{1}{2}$ year old vines; these vary in price but can generally be bought for $\frac{3}{4}$ cts. a piece. They are planted straight out, nurseries not being necessary, the cuttings are from 1′ 6″ to 2′ long and when planted should have four to six joints covered by the soil; they are planted at an angle of about 45° on the east side (as a rule) of the centre stick at a depth of four to six inches, with the top of the cutting leaning up the stick; they are covered with fern leaves, or grass, as protection against the sun, and this protection is left on till the cutting has begun to shoot, say $1\frac{1}{2}$ to 2 months. In dry weather the cuttings may need watering. The cuttings within a week or so of being planted receive a first small application of burnt earth which is afterwards applied regularly every 4 months; in some cases, they apply one basket every month for the first year. After some eighteen months of the burnt earth treatment, ordinary or "raw earth" is substituted, and the vines show excellent growth after this application; if, however, it is continued for more than one application the vines immediately begin to fall off. The "raw earth" chosen is alternately the stiff yellow clay and the best top soil; the vines thus receive a dressing of either one or the other about every fifteen months. As soon as necessary the young shoots are tied to the stick with soft bark or twine, and after 4 to 6 months the permanent posts which are of the hardest wood obtainable, *bilian*, *sauwer*, or *resak*, 12′ long by roughly 4″ square (minim.), are placed 2′ deep in the centre of each mound, the temporary stick being discarded and the vine transferred to the post.

It has been suggested that the planters do not use the hard-wood permanent posts at the commencement and thus save all the trouble of changing the temporary sticks after a certain period, because such posts are injurious to the young vine. Seeing that the large surface and harder nature of such posts would give off more heat than would the small sticks of soft wood, there may well be some advantage in this extra labour. But as often as not when the pepper-planter has started his garden and paid the initial expenses, he has very little spare cash with which to indulge in bilian posts; these are improvements for which he has to wait until times are easier, and this no doubt is a cogent reason in many cases for the primary insertion of temporary sticks.

Originally, vines of five or six months' standing were taken down and layered to form a circle, some two feet in diameter, round the permanent post; the terminal shoot of the vine was then trained up the post in close proximity to its roots. Vines thus treated are retarded six months or so in growth, but they form much stronger plants, which will last a good twenty years if treated with ordinary care. This practice was discontinued by the new planters, who came in with the "boom," owing to the loss of time entailed.

Three main shoots only are trained up the post, these being tied at every joint (say every 4″). All flower is carefully picked off.

If cuttings are desired, from the age of 12–14 months, one main shoot only is allowed to grow, until the vine is 18 months old, when the cutting is taken and the vine treated with half a catty of Prawn Refuse in preparation for its first fruiting. All flowers, of course, up to this point have been rigorously destroyed.

By this method a good sound cutting is obtained which will form a strong vine later on. If the planter intended selling cuttings he would probably run up three shoots, but cuttings obtained from these would be inferior in quality to those obtained from the single shoot.

Similarly, although it is possible to obtain cuttings from a 6 months' old vine, such cuttings are usually weaklings. It is also possible to take three, or even four, lots of cuttings off one plant in a year, but again such are not to be recommended. It is far better, both for vine and cutting, to wait 18 months before taking the cutting.

Fruiting in the ordinary course of events takes a year; that is to say, within a year the crop is finished. During this time burnt earth is applied every four months and the gardeners are kept busy weeding, repairing drains, etc. In certain districts where pepper and gambier gardens have been combined, the refuse gambier leaves are commonly used as a top dressing between the pepper vines, in fact, covering the ground to a depth of several inches. In such cases burnt earth is hardly used, and the vines do equally well.

As will be seen from the above the first crop is obtained when the vine is from $2\frac{1}{4}$ to $2\frac{1}{2}$ years old, the yield being estimated at 1 to $1\frac{1}{2}$ catties of white pepper per vine (4 to 6 catties of green pepper).

At the end of another year, say $3\frac{1}{2}$ years in all, the vine has reached the top of its 10 feet post and is considered full grown, the crop being estimated at 3 catties per vine. And this crop may be counted on for the next 8 to 10 years.

Each season as the crop is just finished, one catty of prawn refuse per vine is applied to the roots in preparation for the next season's crop.

The main cropping time falls between July and October; that is to say the cuttings are planted from November to January during the north-east monsoon, as the young plants require a lot of moisture, and they must be watered during the dry weather.

The average life of a vine in Upper Sarawak is from 10 to 12 years, though this figure *entirely depends* upon the care expended on the cultivation. With perfect cultivation there is no reason why vines should not produce crops up to 20 years and more. One of 30 years has been known to be still in crop; but that of course is exceptional.

The Chinaman recognizes three kinds of cuttings, characterized by:—

(i) A very small leaf with rough surface which is the male and no use for obtaining fruit.

(ii) A larger smooth leaf, which is the female and is used for planting.

(iii) A yet larger smooth leaf, which is hermaphrodite and no use for planting.

In a well-run garden, however, one rarely sees the first and third kinds.

Crop.

To make white pepper, the spikes of fruit are picked just as they are turning red and are crushed under foot so as to loosen the berries from the stalks; the whole is then tied up in bags and soaked in water from seven to ten days. Slowly running water which gets the full heat of the sun is best, warm water accelerating the decomposition of the skin on the pepper corns. When the skins have become sufficiently loose (from seven to ten days) the pepper is put into tubs and washed and stamped upon until all skins and stalks have been extracted. The pepper corns which remain are then spread on mats and dried in the sun and the product is ready for the market.

To make black pepper the fruit is picked not quite so ripe as for white pepper, and is as a rule simply dried in the sun, the skin drying on to the pepper corn and turning black, the pepper is afterwards rubbed by hand so as to separate berries from stalks, and the latter are winnowed out.

A better method of preparing the article is, after picking, to boil the berries in water for a short time, and then dry them as above, this renders the skins tougher and gives a more uniform colour to the product.

Pruning.

This commences as soon as necessary, sometimes at the 6th month, but more often later; it is regularly done year after year, and in this respect the pepper vine differs from many other spices; the more care and attention paid by the gardener in the matter of pruning his vines the better his crops will be, the main points aimed at are the prevention of any superfluous wood, and the avoidance of top-heavy vines. The best shape for a vine is a perfect cylinder, about 4 feet in diameter tapering slightly towards the top.

Labour.

A well-run garden should have one coolie to about 400 vines maximum.

Disease.

So far as is generally known there are three flying insects which attack pepper vines, and one bad ground grub. The former are common, and their ravages are checked by an application of Tuba Solution and Tobacco, used two or three times at intervals of four to seven days. In bad cases four applications have been found necessary. The mixture is sprayed over the vines, *both underneath and on the top* of the leaves and flowers, as the latter are forming.

The ground-grub attacks the roots and I believe can only be destroyed by opening up the roots and killing the individuals wherever found.

A dying back of vines, often on one side only, can doubtless be put down to *fomes*, which the gardeners cure by scarification and fully exposing the attacked roots to the sun for one to four weeks.